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Transportation Plan for the Transport of UF_6 Cylinders, Including ANSI N14.1-Noncompliant Cylinders, from the East Tennessee Technology Park to the Portsmouth Gaseous Diffusion Plant

Rev. 0
September 2004

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Rev. 0

Date Issued—September 2004

Prepared for the
U.S. Department of Energy
Office of Environmental Management

BECHTEL JACOBS COMPANY LLC
managing the
Environmental Management Activities at the
East Tennessee Technology Park
Oak Ridge Y-12 Plant Oak Ridge National Laboratory
Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant

under contract DE-AC05-98OR22700
for the
U.S. DEPARTMENT OF ENERGY

Prepared by:

Guy Wilson, Project Engineer
ETTP UF_6 Cylinder Disposition Project

9/17/04
Date

APPROVALS

H.E. Philpot
Halen Philpot, Project Manager
ETTP UF_6 Cylinder Disposition Project

9/17/04
Date

Mark Allen
ETTP Manager of Projects

9/17/04
Date

John Meersman
Portsmouth Manager of Projects

9/17/04
Date

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ACRONYMS

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BJC	Bechtel Jacobs Company LLC
CFR	Code of Federal Regulations
CID	Cylinder Information Database
CVSA	Commercial Vehicle Safety Alliance
DOE	Department of Energy
DOT	Department of Transportation
DUF_6	Depleted Uranium Hexafluoride
ETTP	East Tennessee Technology Park
FEIS	Final Environmental Impact Statement
GDP	Gaseous Diffusion Plant
HAZMAT	State-level hazardous materials
HMR	Hazardous Material Regulations
LOA	Letter of Authorization
NBIC	National Boiler Inspection Code
NRC	Nuclear Regulatory Commission
PEIS	Programmatic Environmental Impact Statement
PGDP	Paducah, Kentucky Gaseous Diffusion Plant
PORTS	Portsmouth, Ohio Gaseous Diffusion Plant
PSS	Park (ETTP) or Plant (PORTS) Shift Superintendent
ROD	Record of Decision
SARP	Safety Analysis Report for Packaging
TID	Tamper Indicating Device
TRANSCOM	Department of Energy's Tracking and Communication System
UF_6	Uranium Hexafluoride
URL	User Resource Locator
USEC	United States Enrichment Corporation

1. PURPOSE

This plan summarizes transportation requirements, operations, organizational responsibilities, emergency management, public health and safety, and communication issues and administrative controls for the transport of uranium hexafluoride (UF_6) cylinders from the East Tennessee Technology Park (ETTP) to the Portsmouth Gaseous Diffusion Plant (PORTS) through the remainder of the shipping campaign. This is a living document and may be subject to periodic update as regulations, operational plans, and procedures are changed, and as new information becomes available. References made by other documents to this plan should be understood to indicate the latest revision available. Within this plan, Internet hypertext transfer protocol User Resource Locators (URLs) are provided to direct access to the full text version of documents such as Certificates of Compliance, Department of Transportation (DOT) Exemptions, regulations, Records of Decision (ROD), etc., as well as the home pages of many of the key participants (see Appendix A for a listing of URLs referenced).

2. BACKGROUND

Until recently, the U.S. Department of Energy (DOE) and its predecessor agencies were responsible for the enrichment of uranium used in both military and civilian applications. As a result of 50 years of uranium enrichment operations, depleted uranium hexafluoride (DUF_6) was created and subsequently stored in cylinders.

Most of the DUF_6 accumulated since the 1940s is stored in the locations where it was produced. These locations are the gaseous diffusion plants near Paducah, Kentucky (PGDP); Portsmouth, Ohio (PORTS); and at ETTP, formerly K-25, at the Oak Ridge Reservation in Oak Ridge, Tennessee. Cylinders have been used in the uranium enrichment program since the late 1940s for the transportation as well as the storage of UF_6.

Gaseous diffusion plant (GDP) operations at the Oak Ridge facility ceased in 1985. On July 1, 1993, responsibility for uranium enrichment operations at the PORTS and PGDP facilities was transferred from DOE to the United States Enrichment Corporation (USEC). GDP operations were placed in cold standby at PORTS in 2001. However, DOE continues to execute its responsibility for the safe storage and ultimate disposition of all DUF_6.

On April 16, 1999, DOE issued the *Final Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*. On August 2, 1999, the Secretary of Energy announced the ROD documenting the Department's plans for dealing with the national inventory of DUF_6. DOE decided to convert the DUF_6 inventory to a more stable form as quickly as is practicable. This decision is in accordance with the requirements of Public Law 105-204, which directs DOE to convert the UF_6 to a more stable chemical form, and the preferences expressed by stakeholders during the PEIS process. Because of this decision, DOE elected to build conversion plants at the location of the GDPs at PGDP and PORTS. Because there are no plans to locate a conversion facility in Oak Ridge, Tennessee at the shut down GDP, the need was created to transport cylinders from that facility to one of the other GDP sites for conversion.

Portsmouth, Ohio and Paducah, Kentucky are equidistant (each approximately 300 miles) from Oak Ridge, Tennessee. There are approximately 57,000 storage cylinders containing over 500,000 metric tons of UF_6 at the ETTP, PGDP, and PORTS GDPs. As there are more cylinders at PGDP (about 38,000), transporting the ETTP cylinders to PORTS would bring the inventories closer to a balance and this would facilitate the design and operation of two similarly sized conversion plants. On August 29, 2002, DOE awarded a conversion contract involving two plants to Uranium Disposition Services. In September 2002, DOE informed Bechtel Jacobs Company LLC (BJC) that shipment of the ETTP cylinders would be to the PORTS plant.

On June 18, 2004, DOE published the *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site* (FEIS) (DOE/EIS–0360, see Appendix A, URL 1). In the FEIS for conversion, DOE considered the potential environmental impacts from transportation of cylinders (DUF_6, normal and enriched UF_6, and empty) currently stored at the ETTP to PORTS, along with other actions associated with the conversion of DUF_6 at PORTS. On July 27, 2004, following public comments, DOE's Assistant Secretary for Environmental Management published the *Record of Decision for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site*. The ROD addressed transport of DUF_6 and the normal and enriched material from the ETTP to PORTS.

The Tennessee Department of Environment and Conservation and DOE signed Commissioner's Order 97-0378/98-H0023 on February 2, 1999, which states, "DOE shall submit a plan containing schedules for activities that will ensure either removal of all known DUF_6 cylinders and their contents

from ETTP or conversion of the contents of such cylinders will be completed by December 31, 2009." However, the ETTP closure plans provide for all cylinders to be removed from the site by the end of September 2005, in advance of the consent order deadline.

In finalizing the Accelerated Closure Contract for the ETTP in September 2003, DOE assigned BJC responsibility for transporting all the UF_6 cylinders from ETTP to PORTS for conversion. BJC, which began shipping American National Standards Institute (ANSI) N14.1-compliant cylinders on March 17, 2004, expects to complete shipping most or all of the ANSI-compliant cylinders by October 1, 2004. BJC intends to ship all the remaining ETTP cylinders in FY 2005, including the ANSI-noncompliant cylinders (for the current version of the ANSI N14.1 Standard, see Appendix A, URL 2).

All cylinders shipped under this campaign will be shipped in compliance with DOT regulations. DOT permits the shipment of cylinders manufactured after 1971 that meet the requirements of the version of ANSI N-14.1 in effect at the time of their manufacture. Cylinders manufactured prior to 1971 must meet specific requirements in effect at the time of their manufacture, such as Section VIII, Division I of American Society of Mechanical Engineer's (ASME) pressure vessel code, or the Specifications for Class DOT-106A multi-unit tank car tanks, as applicable. If specific criteria for use and wall thickness described at 49 CFR 173.420 (a) (2) (iii) are met, then cylinders manufactured between 1971 and June 30, 1987, may meet the ASME Code in effect at the time of manufacture in lieu of meeting ANSI N14.1. This campaign includes cylinders that do not meet all the requirements of ANSI N14.1 or the applicable alternate requirements of the ASME Code or multi-use tank car tanks, and which must therefore be shipped under applicable DOT exemption(s) and/or Letter(s) of Authorization (LOA) granted by the Nuclear Regulatory Commission (NRC) (see Appendix A, URL 3, 4).

The DOT Research and Special Programs Administration published revised domestic transportation regulations on January 26, 2004, in the Federal Register, with corresponding changes by the NRC. These changes by DOT and NRC can be found at:

- 49 CFR 172 and 173, as published in Federal Register Vol. 69, No. 16, pp. 3632-3696 (see Appendix A, URL 5) and

- 10 CFR 71, as published Federal Register Vol. 69, No. 16, pp. 3698-3814 (see Appendix A, URL 6).

DOT directed that these new rules be implemented by October 1, 2004. Reference to DOT and NRC regulations within this plan is intended to refer to the rules in effect as of October 1, 2004, (see Appendix A, URL 5, 6) and not to the pre-Oct 1 regulations (see Appendix A, URL 7, 8).

An appropriate combination of process knowledge and measurements will be employed to ensure that shipments by BJC comply with applicable DOT regulations, exemptions and NRC LOA's. These shipments do not involve "Highway Route-Controlled Quantities," and are not subject to any laws that require specific routing, notifications, or escorts. However, designated routing was established by DOE in consultation with the states.

UF_6 has been shipped safely in the United States for over 40 years by truck, rail and barge. Historically, no transportation accidents involving a release of UF_6 have occurred in the U.S. This record now includes more than 1600 full 14-ton UF_6 cylinders shipped from the ETTP to PORTS without overpacks between March and August 2004 with no release of UF_6.

3. SCOPE

BJC is responsible for shipping all remaining cylinders from the ETTP to PORTS, including those that are not ANSI N14.1-compliant and those that require protective overpacks. Overpacks for all models of 48" diameter cylinders at the ETTP are expected to be available, if approved for use, in early FY 2005. The shipment of UF_6 cylinders from the ETTP to PORTS has been underway successfully since March 2004, and plans are to ship all ANSI-compliant cylinders by September 30, 2004.

Because the shipping campaign was underway at the time DOT and NRC revised their regulations, DOE requested an exemption (see Appendix A, URL 9) from the new DOT regulations for any nonfissile ANSI-compliant cylinders that have not been shipped by September 30, 2004, and for cylinders that are slightly overmass, but otherwise fit into this category. Cylinders that are slightly overmass perform as well in the regulatory fire as cylinders at their fill limit. Other rationale for the requested exemption is that extensive administrative controls are being used for exclusive-use one-time shipments along a designated route, and that if the exemption is granted, overpacks for 48" diameter cylinders will be deployed as soon as they become available. The population to be shipped under this plan is estimated to include more than 3,000 UF_6 cylinders. These cylinders include many different designs and some that are overfilled and/or above the allowed internal pressure, or have other defects, most of which are specified in Section 1.A.1 of the Depleted Uranium Hexafluoride (DUF_6) Management Plan.

Descriptions of the many cylinder designs can be found in USEC-651, *The UF_6 Manual, Good Handling Practices for Uranium Hexafluorid*e, Rev. 8 (see Appendix A, URL 10). Requirements for shipping uranium hexafluoride cylinders are contained in the DOT Hazardous Material Regulations (HMR), 49 CFR parts 100-185 and ANSI N14.1, Uranium Hexafluoride - Packaging for Transport (see Appendix A, URL 2). Appendix B of this plan provides a more comprehensive listing of regulations applicable to these shipments. The types of cylinders at ETTP are shown in Table 1.

Cylinders that contain UF_6 are further classified according to their content's mass and enrichment in Uranium-235 (^{235}U). Cylinders with the lowest mass are classified in accordance with ANSI N14.1 and HMR as "heel" quantities or as "empty cylinders." Some heel cylinders will remain onsite after October 1, 2004, and will be shipped to PORTS under this plan.

Empty cylinders contain no UF_6 and many have been rinsed with a sodium bisulfite solution. These may be transferred to a disposal site without chemical conversion (outside this plan) or they may be shipped along with the other cylinders to PORTS under this plan.

Table 1. Types of cylinders at the ETTP

Cylinder model	Shipping limit (lbs)	Material of construction
sample size (1S)	1	Nickel or Ni-Cu Alloy
sample size (2S)	4.9	Nickel or Ni-Cu Alloy
sample size (FAB-3)[1]	not ANSI-listed	Steel
sample size (UNK, SAM)[2]	not ANSI-listed	Steel
5" diameter (5A)	55	Nickel or Ni-Cu Alloy
8" diameter (8A)	255	Nickel or Ni-Cu Alloy
12" diameter (12A)	not ANSI-listed	Nickel
12" diameter (12B)[3]	460	Nickel or Ni-Cu Alloy
30" diameter (30B)	5020	Steel
30" diameter (30A)	not ANSI-listed	Steel
48" diameter (48A, X, T, G, H, HX, O, OM, F, OH, OHI, and Y)	21030 – 27560	Steel

The cylinders referred to as "heel" cylinders contain a very small amount of UF_6 and/or other uranium compounds as defined in the ANSI N14.1. To qualify as a heel, a cylinder's contents cannot exceed a prescribed maximum net weight. These weights are summarized in Table 2. Under the regulations effective October 1, 2004, cylinders containing more than 100 g of UF_6 are subject to the drop and fire test requirements. ANSI-compliant cylinders containing less than heel mass limits can be shown to comply with these new requirements without a protective overpack, and will be shipped accordingly. Although most or all ANSI-noncompliant heels may also be capable of passing all regulatory tests, BJC has voluntarily elected to ship ANSI-noncompliant heels in protective overpacks because it adds a margin of safety and due to the complexity and costs involved in demonstrating the performance of these cylinders through mathematical modeling.

The next higher mass cylinders are the partially full cylinders. These cylinders exceed the heel mass limits but are filled to less than 75% of their maximum capacity (i.e., 61% of the cylinder's volume for enriched assay UF_6 and 62% for depleted). The final and highest mass category is the full cylinders, which vary from 75% of their fill limit to overfilled in the case of some nonfissile cylinders (> 62%).

Because ANSI inspections have not been completed for all cylinders at the ETTP, the precise number of noncompliant cylinders has yet to be determined. Some noncompliant cylinders will be made compliant during the shipping campaign whenever practical measures can be taken in the cylinder yards to do so. Examples of ways to make noncompliant cylinders compliant include changing valve tinning, reducing internal pressure, removing content mass, changing out valves, changing out plugs, straightening a bent lifting lug, or performing a code-shop welding repair. Overfilled mass content is the greatest single factor in noncompliance (see Table 3), and inventory transfers are not planned at the ETTP. A DOT exemption has been requested by DOE to allow shipment of some slightly overfilled but otherwise ANSI-compliant nonfissile cylinders that do not present a safety issue, and for continuation of ANSI-compliant cylinder shipments without overpacks pending their availability and approval by DOT.

[1] Although the FAB-3 (fabricated 3" diameter) cylinder has drawings and specifications, it is non-ANSI and as-built products vary in construction.
[2] The UNK (unknown design) and SAM (generic sample) are non-ANSI sample cylinders that encompass a variety of user created designs and generally have no associated drawings or specifications.
[3] Based on inspection data, most or all 12B cylinders at the ETTP are fabricated from modified 12A cylinders and are therefore technically ANSI-noncompliant 12A cylinders.

Table 2. Maximum allowable heel mass limits per ANSI N14.1

Cylinder model/description	Maximum heel mass for shipping (lb)
1S (sample size)	n/a
2S (sample size)	n/a
5A (5” diameter)	0.1
5B (5” diameter)	0.1
8A (8” diameter)	0.5
12A (12” diameter)	1
12B (12” diameter)	1
30A (30” diameter)	25
30B (30” diameter)	25
48A (thick-wall)	50
48X (thick-wall)	50
48T(thin-wall)	50
48G (thin-wall)	50
48H (thin-wall)	50
48HX (thin-wall)	50
48O (thin-wall)	50
48OM (thin-wall)	50
48F(type OH & OHI Thick-wall)	50
48Y(thick-wall)	50

The number of ANSI non-compliant cylinders has not been determined, since ANSI-compliance inspections are not yet complete for a substantial fraction of the population. The decision to make a currently noncompliant cylinder compliant will be made on a case-by-case basis as cylinders are removed from the stack and ANSI-compliance inspection is completed. However, expectations of compliance can be quantified based on limited non-code visual inspection data located in the Cylinder Information Database (CID), historic fill-record data transposed to CID from Nuclear Material Control and Accountability records, and limited pressure measurements on a discrete subpopulation representing Type 48OM and 48G cylinders filled late in the span of plant operations.

Table 3 summarizes known defects from CID for all depleted assay cylinders on the ETTP site prior to shipping. These defects are from the routine non-ANSI inspections as described in Section 1.A.1 the DUF_6 Management Plan. Although inspection results by a National Boiler Inspection Code (NBIC) inspector could vary, a good general agreement is expected.

Table 3. Depleted assay cylinder defects

Category	Description of Defect	Total Number of Cylinders
A	Over Mass	2827
B	Body & Shell Defect	166
C	Valve Defect	176
D	Plug Defects	2953
Multiple Defects	A and B	155
Multiple Defects	A and C	107
Multiple Defects	A and D	2811
Multiple Defects	A and B and C	0
Multiple Defects	A and B and C and D	0

The over mass statistic in Table 3 is based on nameplate data, when available, and on ANSI N14.1 specification volume when nameplate data is unavailable. By obtaining available nameplate data, some of the cylinders currently classified as overfilled may fall within fill limits and thereby be determined to be ANSI-compliant. Nameplate volumes are based on water fill measurements made by the cylinder manufacturer, whereas current volumes values in CID are cylinder specification volumes.

Until the present, BJC's plans for shipping UF_6 cylinders from the ETTP to PORTS have been based on estimates that around 3,100 DUF_6 cylinders are ANSI-noncompliant and will require a DOT exemption. Based on their specification volume, 2,877 of these cylinders are classified as "overmass" (i.e., overfilled). It is believed that up to 75% of these overmass cylinders may have no other defect than apparent overfilling, or that if some other defect exists, it can be eliminated through BJC field operations.

On October 2, 2002, USEC applied to DOT for an exemption from:

1. The requirement of 49 CFR 173.420(a)(4), which states that the volume of material may not exceed 62% of the certified volume of the packaging.

2. The requirement found in 49 CFR 173.420(a)(2)(iii)(D), which lists minimum thickness of cylinder shells and heads.

On February 4, 2003, DOT issued Exemption DOT-E 13164 (see Appendix A, URL 11), which exempted USEC from 49 CFR as it pertains to 48OM cylinders having a minimum wall thickness of 0.25 inches. A Safety Control Measure included in the exemption issued by DOT required that the 48OM cylinders transported under the exemption would be inspected prior to transport to ensure the water volume, UF_6 content, and pitting was in accordance with acceptable levels identified in USEC's application.

BJC established a method for calculating percent filled based on field measurements and calculations of volume that is similar to USEC's methods, but which encompasses the additional cylinder models involved in this campaign. Although a final decision has not been made, it is possible that that an exemption may be sought by DOE (if advantageous) that applies to the following set of cylinders:

- ANSI-compliant cylinders that have no other defect beyond apparent overfilling (based on the generic use of specification volume or erroneous reporting of water-weight volume)
- ANSI-compliant cylinders for which the as-built calculated volume based on field-measurements indicates an acceptable mass content.

Approximately 17% of late vintage 48O, 48OM, and 48G cylinders were overpressure based on recent pressure measurements made during the FY 2004 ANSI-compliant shipping campaign. Based on these measurements, the overpressure cylinders that do not undergo pressure reduction will be deferred from shipment until after October 1, 2004. Overpressure, for determination of DOT compliance, means greater than 14.8 psia. The highest pressure measured to date in a cylinder at the ETTP is 24.8 psia (10.1 psig). These pressure measurements are not considered representative of the general population because they are from cylinders filled during a very narrow span of diffusion plant operations. However, pressure may be relieved by venting the pressure to a suitable receiver, such as a cylinder under vacuum, thereby making the formerly over pressurized cylinder ANSI-compliant. Currently, pressure is being relieved on some of the full 48" DUF_6 cylinders to allow their shipment as ANSI-compliant during FY 2004.

The valve damage statistics in Table 3 are also considered nonrepresentative of the general population, because they are based on valves on cylinders in storage. Valves will not be subjected to operation prior to the pressure check. Upon use, more valves are likely to experience problems than among static valves. When a problem valve is discovered upon use of the valve, it is changed out prior to shipment of the cylinder. As valve defects are discovered, the number of ANSI-noncompliant cylinders in Table 3 will increase. As valves are replaced or repaired, the number of ANSI-noncompliant cylinders will decrease again accordingly. Valves will be replaced or repaired on all 176 cylinders with valve defects shown in Table 3, but only 165 of those cylinders will become ANSI-compliant as a result of the valve change-outs, since 11 of these cylinders are also over mass (see the multiple defects row in Table 3 that refers to cylinders having both defects A and C). In reviewing the data in Table 3, it is critical to realize that as pressure checks occur, additional cylinders are expected to be identified as ANSI-noncompliant due to valve defects. Prior to shipment, these cylinders will be made ANSI-compliant by valve changeouts.

No action is expected for body, shell, and plug defects that do not threaten cylinder integrity or containment. These cylinders are expected to be shipped in an overpack under applicable DOT exemption. If any cylinders are discovered to have body, shell, or plug defects that would threaten containment during shipping, then these defects will be corrected onsite prior to shipping. After such repairs, it is likely that only a fraction of those originally showing plug defects would become ANSI-compliant, due to the high correlation between cylinders with plug defects and those over mass in Table 3. Both defects would have to be relieved to achieve ANSI-compliance, should the requested DOT exemption not be granted for over mass cylinders. ASME code shop repairs to heads and shells would be required to achieve ANSI-compliance for those with head and shell defects, and ASME code shop welding repairs and modifications are not practical in the cylinder yards.

The typical steps involved with shipping full or partially-full cylinders (overpacking steps included) are shown in Table 4.

Table 4. Cylinder shipping activity detail
(steps generally applicable to shipping large cylinders in overpacks)

Steps
Pre-Move visual inspection
Unstack and/or relocate storage cylinders with approved handling equipment
Move cylinders to staging
ASME Code Vessel Inspection (if required by Exemption)
Evaluation of "suspect" regions as needed
Dye penetration test if needed
Ultrasonic thickness measurements if needed
Cold pressure check
Replace valve if needed
Relieve pressure with HF capture if needed
Prepare Nuclear Materials Control & Accountability documentation
Cylinder contamination surveys
Decontamination and resurvey as necessary
Valve cover/TID seal installation
Conveyance inbound survey
For Overpacked Cylinders:
Remove overpack top section
Place cylinder on overpack base
Ratchet tighten straps to secure cylinder to overpack base
Replace overpack top section
Secure overpack closure with locking pins
Tie down cylinder/overpack top on trailer with straps or chains (depending on design)
Perform transport index / outbound survey
Final tiedown inspection
Complete DOT shipping papers
Pre-transportation inspection, survey and release of conveyance

4. PROTECTIVE OVERPACKS

4.1 OVERPACKS

DOE expects to continue shipment of over heel mass ANSI-compliant cylinders without overpacks past October 1, 2004, subject to DOT approval of the exemption request in this regard (see Appendix A, URL 9), and pending availability of overpacks and regulatory approval(s) for their use in this shipment campaign. Following their approval, it is expected that all cylinders remaining at the ETTP containing above a heel mass of UF_6, as well as all ANSI-noncompliant heels, will be shipped in one of two models of overpacks – the P-1 Overpack, or the UX-30 Overpack. Plans are to ship 48" cylinders that contain above a heel mass in the P-1 Overpack, and to ship 30" diameter and all smaller diameter cylinders above heel mass in the UX-30 Overpack. In order to accomplish these plans, the following regulatory approvals will be sought that involve overpacks:

- DOT issuance of an exemption to ship up to four thousand 48" diameter cylinders that contain UF_6 classified as non-fissile or fissile-excepted, UN2978, in P-1 Overpacks.

- NRC authorization to ship up to one hundred 48" diameter cylinders that contain a very low mass (three above heel mass) of UF_6 classified as fissile, UN2977, in P-1 Overpacks.

- DOT issuance of an exemption to ship up to nine hundred 30" diameter and smaller cylinders that contain UF_6 classified as non-fissile or fissile-excepted, UN2978, in UX-30 Overpacks.

- NRC authorization to ship up to one hundred 30" diameter and smaller cylinders that contain UF_6 classified as fissile, UN2977, in UX-30 Overpacks.

Requests for these approvals are currently in preparation, or review. All requests will be based on the rationale that the use of the two overpacks, along with administrative controls, will provide an equivalent level of safety to that achieved under the applicable DOT and NRC regulations (see Appendix A, URL 5,6).

In addition, some shipments may employ DOT exemption E-11868 regarding valve tinning, to which BJC has been granted party status (see Appendix A, URL 12).

4.2 THE P-1 OVERPACK

The P-1 Overpack was designed and fabricated in 2004 by Petersen, Inc. of Ogden, Utah (see Appendix A, URL 13). It is not a "licensed" overpack, because it is not intended for use in general commerce to transport fissile UF_6; rather, it was designed exclusively for ETTP's population of 48" diameter UF_6 cylinders to be shipped in this one specific campaign. The P-1 Overpack (shown in Figures 1 and 2) is an insulated carbon steel box, 7 ft (width) x 14 ft (length) x 6 ft (height). The P-1 has the following two major components:

1. Lid Assembly – forming the top and sides of the box
2. Pallet Assembly – forming the bottom of the box

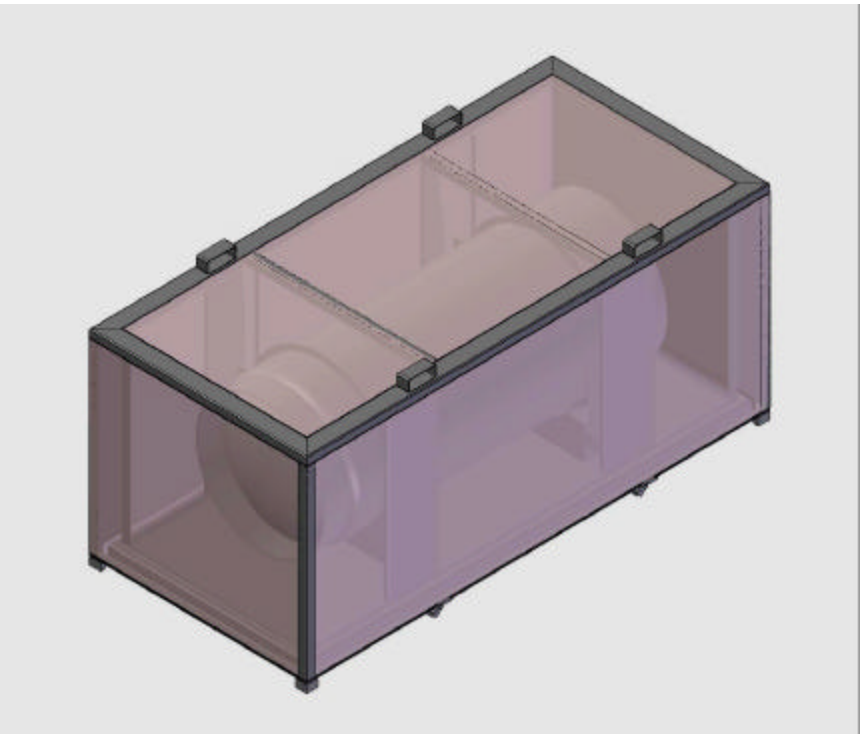


Figure 1: The P-1 Overpack.

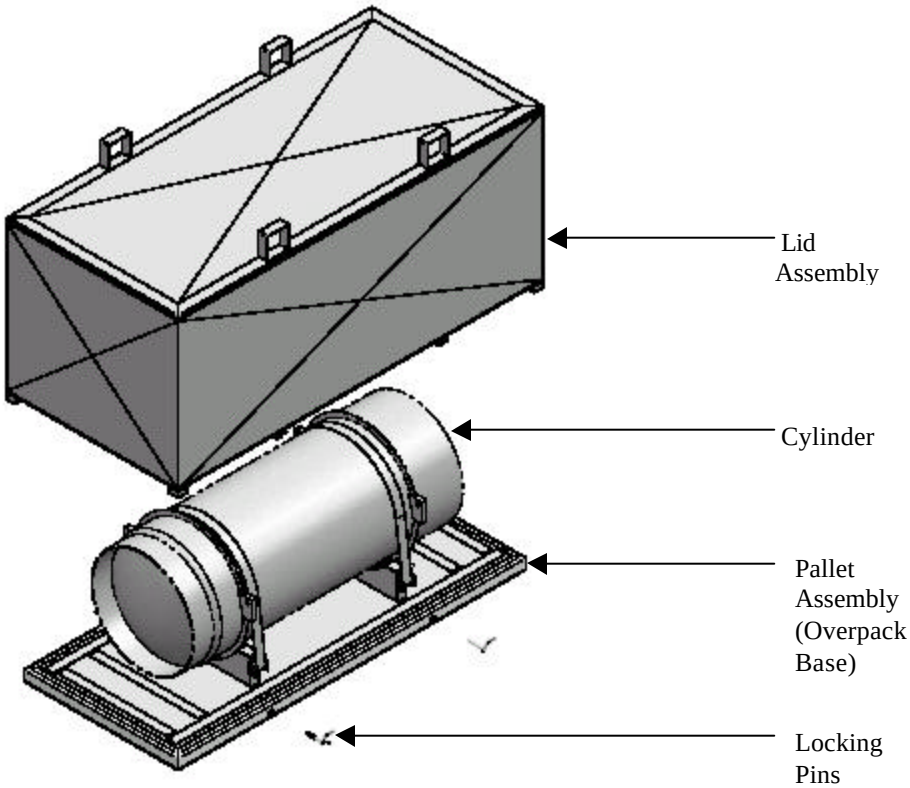


Figure 2: Lid and pallet assembly of the P-1.

The total tare weight of the P-1 overpack is roughly 6,237 lbs. The Lid Assembly (~3,410 lbs) serves as a protective environmental cover. It has an exterior skin made of 14 gage steel that is lined with 6" thick ceramic insulation that provides thermal protection from the heat of a fire.

The Lid Assembly of the P-1 Overpack is equipped with top mounted forklift pockets that allow the unloaded UF_6 Overpack (Lid Assembly and Pallet Assembly) to be lifted onto a trailer for transport. The Lid Assembly can then be separated from the Pallet Assembly via four each tamper resistant Load Pin Assemblies. With the Lid Assembly off the Pallet, UF_6 cylinders can be loaded into the Pallet Assembly saddles. The forklift pockets are designed to carry the weight of the UF6 Overpack empty, that is, without being loaded with a UF_6 Cylinder. The pockets are not designed to carry the weight of the entire overpack loaded with a cylinder.

The Lid Assembly is thermally sealed to the Pallet Assembly via a 1" thick by 3" wide fabric wrapped seal material that is partially compressed when the Lid is resting in place on the Pallet Assembly. This seal is thermal only and is not designed to allow the overpack to act as a pressure vessel. Guide Blocks are welded to the four corners of the Lid Assembly to allow proper alignment and locking with the Pallet Assembly.

The Pallet Assembly (7 ft wide x 14 ft long x 6.5 in high, and weighing about 2,827 lbs) is constructed with a flat 6 x 4 rectangular structural tube frame. The top and bottom surfaces of the frame are skinned with 3/16" thick steel. The tubing and the voids between the skins are filled with ceramic insulation. The pallet design includes two saddles designed to support the 48" diameter UF_6 cylinders on ½" thick neoprene pads. The UF_6 cylinder is secured to the saddles of the pallet with two each 4" wide truck winches.

The removable lid assembly facilitates the placement of cylinders on two saddles attached to the pallet assembly. The saddles are spaced to avoid interference with reinforcement rings on the cylinders. After placement on the saddles, the cylinder is attached to the saddles by two suitably rated nylon straps that are ratcheted down to the saddles to which the straps are permanently affixed. Lateral movement of the overpack base is constrained by blocking and bracing on the trailer bed surface, normally steel angle iron welded to the trailer structural beams. After the cylinder is securely strapped to the overpack base, the overpack lid is placed on the base using a forklift truck. Four forklift pockets located on top of the overpack lid facilitate lifting. After placement of the lid on the base, suitably rated nylon straps are employed to constrain the overpack to the trailer bed through the forklift pockets. Tamper Indicating Devices (TIDs) are inserted to indicate whether the pins have been tampered with prior to removal of the overpack lid at the packaging receiver site. The P-1 overpack has a smooth epoxy-coated external surface - free from protruding features, and is easily decontaminated.

The P-1 is designed, when used with the "worst case" cylinder at the ETTP, to meet the applicable DOT and NRC regulations. The "worst case" cylinder is a hypothetical cylinder having the worst case value for wall thinning, pressure, mass, and other measured conditions of interest. The "worst case" cylinder is therefore far worse than any actual cylinder found at the ETTP. Unlike the UX-30 Overpack, the P-1 is not designed for general use to transport fissile UF_6 in commerce because it's application is limited to this specific campaign. There are only three 48" diameter cylinders at the ETTP that contain greater than a heel mass of fissile UF_6 and all three are very low in mass content. Therefore, the additional cost of designing the P-1 to meet all the requirements that apply to full fissile cylinders in general commerce was unwarranted. The P-1 Overpack, in concert with the administrative controls that are being required of these shipments, will provide an equivalent level of safety to the new regulations for all 48" diameter cylinders at the ETTP, including the three fissile cylinders that are filled above the mass that would allow them to be shipped as heels.

4.3 THE UX-30 OVERPACK

The UX-30 overpack containing a Model 30B or 30C cylinder is routinely used as packaging that provides safe and reliable transportation of UF_6 enriched to 5 wt % assay in the U.S. and throughout the world. It meets the International Atomic Energy Agency's TSR-1 shipping regulations, on which the new DOT and NRC regulations effective October 1, 2004, are based. The UX-30 meets all requirements of 10 CFR 71, and is described in the current revision of NRC Certificate of Compliance No. 9196 (see Appendix A, URL 14).

The current certificate holder for the UX-30 is Duratek, Inc (URL 15). The certification was issued based on an application with a Safety Analysis Report for Packaging (SARP) submitted by Chem-Nuclear Systems, a company now owned by Duratek. This international standard packaging as described in the SARP consists of two elements:

1. a Model 30B or 30C cylinder (or the equivalent), and
2. a UX-30 overpack.

The UX-30 consists of two halves, joined at a horizontal parting plane (see Figure 3). The top half of the overpack is removed to provide easy access to the cylinder. All exposed surfaces of the UX-30 are fabricated from ASTM A240 304 stainless steel.

The UX-30 is comprised of an inner and outer shell. The six-inch space between the shells is filled with a rigid, energy-absorbing, and insulating closed-cell polyurethane foam with well-documented mechanical and thermal properties. The design of the UX-30 includes such features as:

- Indexing pins with cross-locking "ball lock" pins assure rapid high strength package assembly.
- A "step-down" closure design forces foreign material to travel against gravity and then through a seal to reach the overpack interior.
- Nested placement of the lid half of the overpack assures its protection during all handling operations.

The lid of the UX-30 is equipped with lifting features designed to lift the lid only. These features will be rendered inoperative during transit.

The UX-30 upper section is designed to be lifted using steel lifting lugs attached to the lid. There are no lifting devices that are structurally part of the UX-30 used to lift the entire loaded package. Lid lift lugs may be one of two designs. The first design employs a two-point lift with lugs located on each end of the lid. Alternatively, the lid may be lifted by four clips mounted on the sides of the lid near the parting plane.

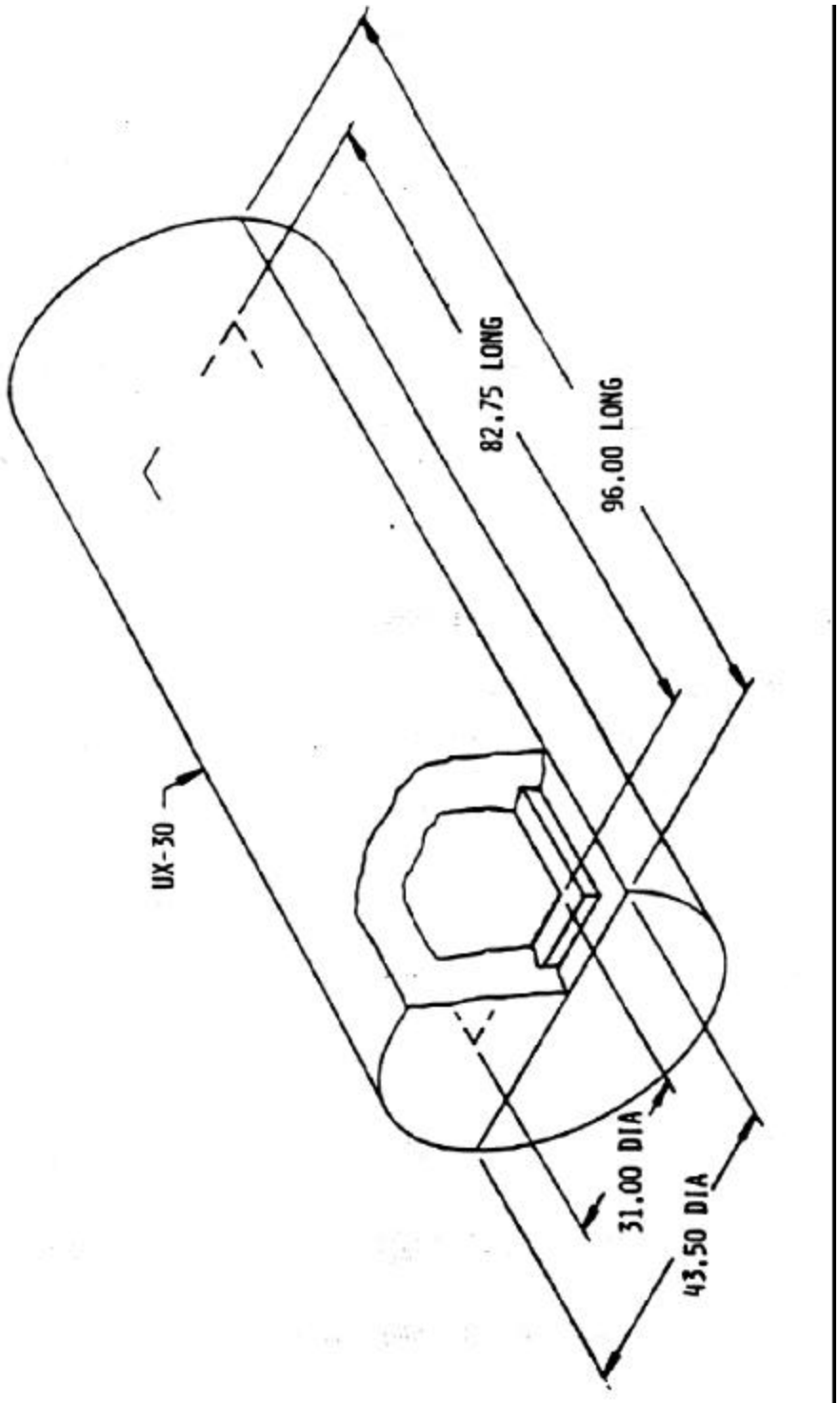


Figure 3: UX-30 Overpack

To ship cylinders that are smaller than 30" in diameter, various foam inserts will be used inside the UX-30 Overpack. The external dimensions of all these inserts will nominally mimic the 30B cylinder dimensions, while internal cavities will be machined into the foam to fit each model of the smaller cylinders. As described in the UX-30 SARP, the UX-30 Overpack protects its licensed 30B or 30C cylinder contents sufficiently in the hypothetical regulatory fire following a 30 ft (Type "B") drop to prevent liquification of the UF_6. The UX-30 Overpack, which is used globally for the transport of UF_6 enriched up to 5 wt % assay, is designed to more rigorous standards for its commercial use. It will pass the drop and puncture tests described at 10 CFR 71.73(c) (1) and (3) and subsequently pass the fire described at 10 CFR 71.73 c (4), whereas the P-1 is designed to pass the 1 to 4 ft. (Type "A") drop test described at 49 CFR 173.465 (c) (1) and the fire described at 10 CFR 71.73 c (4) as independent events.

In the event of a fire, the additional foam insulation provided by the machined inserts in the UX-30 Overpack will easily hold the smaller cylinder contents to a temperature below the triple point of UF_6. The foam inserts will also provide additional shock absorption in the event of impacts. These inserts provide an increased margin of safety for NRC to grant authorization to ship the small diameter fissile content ETTP cylinders in UX-30 Overpacks.

Along with the 30B cylinders described in the SARP as part of the UX-30 licensed packaging, and the smaller cylinders which will be protected by the added foam inserts, this shipping campaign also includes some Model 30A cylinders planned for shipment in UX-30s without additional foam inserts. Model 30A cylinders were used to feed the GDP cascade during early plant operations. These cylinders pre-date the ANSI N14.1 Standard and, unlike the ANSI-specified cylinders, were not built to ASME Code specifications, but rather to DOT Specification 106A500X for Multi Unit Tank Car Tanks, which meets American Association of Railroads transport standards. However, most of the cylinders do not meet this standard today, due to modifications and incorrect marking or loss of marking. Some corrosion has been observed in ultrasonic and visual inspections of ETTP 30As to date, but no pits have been found to exceed a conservative corrosion allowance, although in some cases, corrosion has made markings illegible. The primary inspection deficiency found is the use of a nonstandard valve and plug configuration. A one-inch valve was installed when the cylinders were converted from chlorine service to UF_6 use. The 30A is a DOT certified package that can be found in the "Test and Evaluation Document for the DOT Specification 7A Type A Packaging," (DOE/RL-96-57, Volume 2, Rev. 0-D) (see Appendix A, URL 16). The 30A is no longer used in diffusion plant operations, and was never licensed as a fissile UF_6 container as part of the UX-30 packaging or other available packaging, so that NRC authorization will be required to ship 30A cylinders in the UX-30 Overpack.

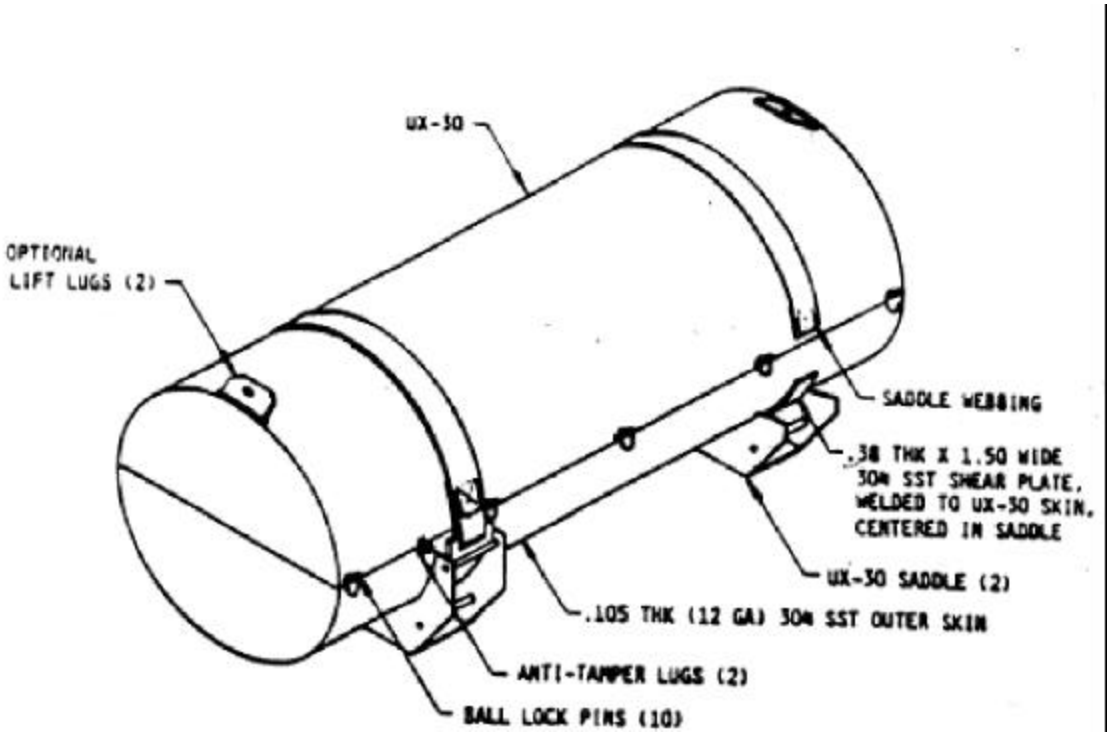


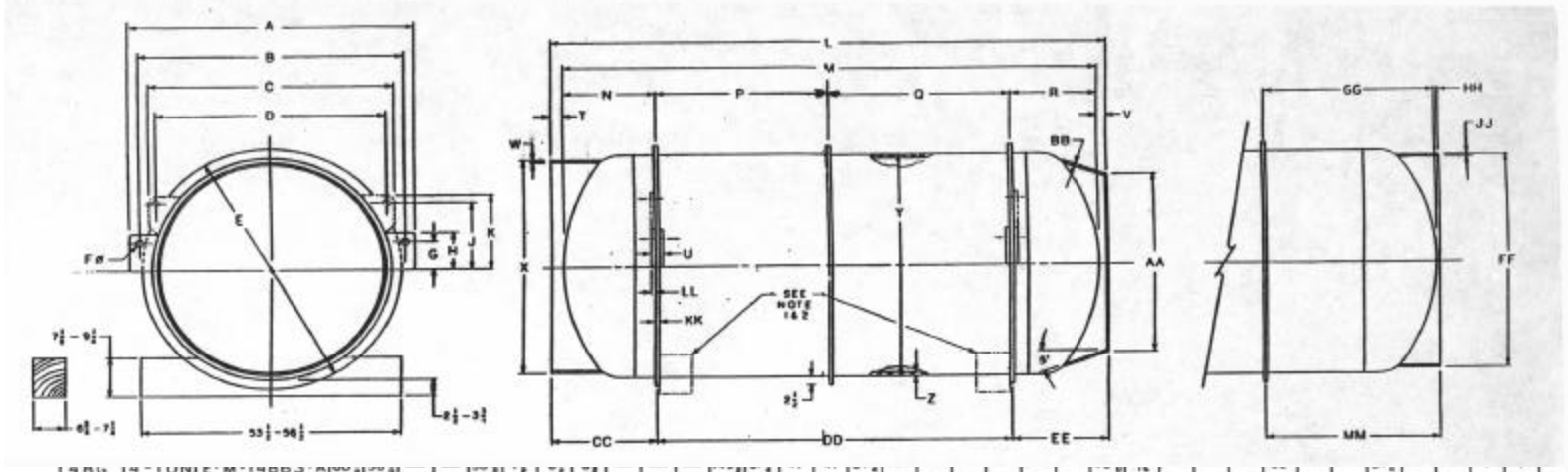
Figure 4: UX-30 Overpack in a typical cradle

Table 5. Models of 48-inch diameter cylinders at ETTP

Cylinder Type	Code-Qualified ?	Purchase Date	Drawing Number	Length w/ skirts (in.)	Valve /Plug Skirts	OD (in.)	Steel Plate	Stiffening Ring[1] Width (in.)	Lifting Lug Height (in.)
48A(P) 10-TON	NO	1951	D-PM-P-3045	118 1/2	C/T	49 1/2	5/8 " A285	3/4	8 1/2
48X 10-TON	YES	1953	E-S-12292-B	118 3/4	C/C	49 1/4	5/8 " A285, A516	1	8 1/2
48T 10-TON	YES	1956	D-S-10137	120	C/C	48	5/16 " A285	1/2	8 1/2
48O 14-TON	YES	1958	E-S-10313-D	145 1/4	NONE	48	5/16 " A285	6[2]	16 7/8
48OM 14-TON	NO	1961	E-S-10313-F	145 1/4	NONE	48	5/16 " A285	1 1/8	16 7/8
48OM 14-TON	YES	1968	E-S-12292-A	145 1/2	NONE	48 5/8	5/16 " A285	1	16 7/8
48OM 14-TON	YES	COUNTED ABOVE	E-S-12292-A	145 1/2	NONE	48 5/8	5/16 " A285	1	8 1/2
OH 14-TON	NO	1961	E-S-11198-A	149 1/4	C/NONE	49 1/4	5/8 " A285	7/8	16 7/8
OHI 14-TON	NO	1962	E-S-11283-A	149 3/4	C/T	49 1/4	5/8 " A285	7/8	15 3/4
48G 14-TON	YES	1977	E-M-14863-A	145 1/2	NONE	48 5/8	5/16" A285, A516	1	8 1/2
48HX 14-TON	YES	1978	E-M-14863-B	148 1/2	C/C	48 5/8	5/16" A285	1	8 1/2
48Y 14-TON	YES	1979	E-S-12292-C	146 3/4	C/C	49 1/4	5/8 " A516	7/8	8 1/2
48H 14-TON	YES	1979	E-M-14863-B	148 1/2	C/C	48 5/8	5/16" A516	1	8 1/2

[1] Generally three solid steel rings extending 2 1/2 inches from the cylinder surface, and fabricated from either plate or bar stock.
[2] Model O cylinders have two stiffening rings, which were fabricated from structural channels.
Valve / Plug Skirts: C = cylindrical; T = tapered.

Figure 5: Dimensions of 48” diameter cylinders.



CYL. TYPE	DWG. NO	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM
"P" 10-TON	D-PM-P-3045	58	55	—	—	54	1	6	8																												
"T" 10-TON	D-S-10137	57	53	—	—	52	1	6	8																												
"O" 14-TON	E-S-10313-D	—	—	51	47	51	1	—	—																												
"OM" 14-TON	E-S-10313-F	—	—	50	46	53	1	—	—	15	16	—	145	31	41	41	31	—	—	—	—	—	48	—	—	—	82	—	—	31	—	—	—	1	—

"48H" 14-TON	E-M-14864-A	60	56	—	—	53	1	6	8	—	—	148	145	31	41	41	31	—	—	—	—	—	48	48	—	—	34	82	—	48	31	—	—	1	1	32
"48X" 10-TON	E-S-12292-B	60	56	—	—	54	1	6	8	—	—	118	115	19	38	38	16	—	—	—	—	—	48	49	—	—	22	76	—	48	16	—	—	1	1	17
"OH" 14-TON	E-S-11198-A	—	—	54	50	54	1	—	—	14	16	—	146	32	41	41	32	—	—	—	—	—	48	49	—	—	34	82	—	—	32	—	—	1	1	—
"OH1" 14-TON	E-S-11283-A	—	—	53	49	54	1	—	—	14	15	149	146	32	41	41	32	20°	—	—	—	—	48	49	—	40	34	82	32	—	32	—	—	1	1	—

NOTES:

1. TYPICAL PLACEMENT OF CHOCKS AT ORGDP
2. ENDS THAT SHALL BE VISIBLE PER ES-KMD-80185-1, TYPICAL EACH SIDE
3. DIMENSIONS SHOWN ARE REFERENCES ONLY AND NOT TO BE USED FOR FABRICATION OF CYLINDERS

5. TRANSPORTATION OPERATIONS

5.1 LOADING METHODS

The loading methods for the P-1 Overpack are described in applications for exemption being submitted to the DOT that are based on deployment of the P-1 for shipping. Loading methods for the UX-30 Overpack are described in the UX-30 SARP and will be expanded by BJC to employ the use of foam inserts for the cylinders less than 30" in diameter. Loading and unloading of both cylinders and the P-1 and UX-30 overpacks at ETTP and PORTS will be described in BJC procedures or work instructions.

Loading methods for ANSI-compliant heels and any over heel mass ANSI-compliant (or overmass and otherwise ANSI-compliant) cylinders shipped without overpacks under applicable DOT exemption after October 1, 2004 are described below. Blocking, bracing, and tie downs will include certified chains, chain binders, and straps that meet the applicable requirements of the DOT Federal Motor Carrier Safety Regulations, and the particular blocking and bracing requirements for carriage by public highway of the DOT HMR 49 CFR Part 177. Because the remainder of this campaign includes many different weights and packagings, the various tie down systems are not described in detail here. All tie downs will meet the requirements of 49 CFR 393.

Sample size cylinders will be packaged in DOT-approved containers and then blocked, braced, and tied down on the transport vehicle. Small fissile cylinders may be packaged in drums, ST-90 Boxes, wire cages, or similar containers and may be strapped onto flatbeds or lowboy trailers, or may be hauled inside closed vans. Some smaller cylinders may be palletized when advantageous for handling. Fork trucks may handle and load small diameter (less than 30-inch) cylinders or their associated packaging. Multiple heel quantity cylinders will normally be loaded onto a single conveyance, typically a flatbed, for shipment.

5.2 ROUTING

Although highway route controlled quantities are not involved and shipments will be DOT-compliant, a preferred and alternative routing was established in consultation with the states of Tennessee, Kentucky, and Ohio.

Alternate parking areas have been selected with States' input along the primary and alternate shipment routes as a contingency for natural, technological, or civil unrest events. Alternate parking areas other than the ETTP and PORTS were selected by DOE with input from the States.

5.3 INSPECTION

For cylinders which are expected or known to be noncompliant with ANSI N14.1, and will be overpacked regardless, the data derived from a code inspection intended to verify noncompliance would be of questionable value. Unless required as a condition of the exemption, cylinders known to lie well within the parameters assumed for the "worst case" cylinder will not undergo a code visual inspection to determine ANSI-noncompliance. The extent of inspection beyond the routine inspections described in the DUF_6 Management Plan and procedures for onsite cylinder handling for shipment, will be determined by the DOT exemption application and wording of the applicable exemption or LOA. The routine inspections are performed at both ETTP and PORTS during handling for the shipments. If documentation of compliance with ANSI N14.1 is needed for any cylinders after October 1, 2004, Code visual inspections will be performed by a National Board Boiler and Pressure Vessel Inspector holding active certification status.

Prior to arrival onsite, the truck tractors and trailers will be Commercial Vehicle Safety Alliance (CVSA) certified. Before releasing a shipment, the truck tractor, trailer, driver qualifications, blocking and bracing, tie-downs, marking and labeling, placards, and shipping documents are verified for compliance with all appropriate regulations. This inspection process is similar to the CVSA Level I inspection, but does not employ computerized driver background checks because these data are available exclusively to law enforcement officers. Radiation surveys meet the requirements of the DOT HMR in 49 CFR 173.441 and 173.443 and the DUF_6 Management Plan. States' representatives are permitted to participate in the inspections.

Each P-1 Overpack and UX-30 Overpack is inspected upon receipt by BJC. The P-1 and UX-30 will be periodically inspected at frequencies described in the Exemption or LOA requests describing their use. The UX-30 is also inspected according to its SARP.

5.4 TRACKING

Tracking of shipments will rely on DOE's Tracking and Communication System (TRANSCOM). State personnel will be able to track each shipment via TRANSCOM from the time of departure through arrival at PORTS (see Appendix A, URL 17).

5.5 EMERGENCY RESPONSE

The States and local responders have primary responsibility for response to an incident or accident involving shipments of UF_6 in this campaign. BJC will provide assistance and technical information to the responders. DOE has assisted emergency responders in the form of training and requested information. Local emergency-response organizations along the transportation route are the first emergency responders in case of a transportation incident or accident involving a shipment of DUF_6. State-level hazardous materials (HAZMAT) and/or radiological response teams provide technical assistance. Such teams are activated by an Incident Commander or other appropriate State or local authority.

Federal resources are also available for technical assistance from the DOE Radiological Assistance Program in accordance with DOE Order 5530.3.

Emergency response instructions will accompany each shipment. In addition to notifying local authorities, the drivers are instructed to notify his or her dispatch, the BJC Transportation Specialist, and the emergency response telephone number indicated on the shipping paper. The emergency response telephone number (manned on a 24-hr basis) in the Park Shift Superintendent's (PSS) Office for the ETTP is 1-865-574-3282. Each PSS has training, experience, and emergency response information for answering questions regarding these particular hazardous materials shipments. The *2000 Emergency Response Guidebook* contains some useful information for responding to a transportation accident involving a UF_6 cylinder on Page 280, Guide 166, under Radioactive Materials – Corrosive (Uranium Hexafluoride/Water Sensitive).

5.6 CLEANUP/RECOVERY

Carriers have primary responsibility for recovery and cleanup, have recovery and emergency operation plans (see the carriers' current emergency response plan, under separate cover) as required by the DOT HMR, and will coordinate with State, and local agencies regarding these activities.

In case of an accident releasing radioactive material, DOE and BJC will coordinate with carriers, and with State and local authorities to ensure the cleanup is performed to an acceptable level.

5.7 CAMPAIGN SCHEDULE

The cylinder campaign covered by this plan will involve shipping an estimated 3000 ANSI-noncompliant cylinders to PORTS after October 1, 2004, plus any ANSI-compliant cylinders that were not shipped before October 1, 2004. Plans are to accomplish all shipments by September 30, 2005.

Information that is more specific than this plan regarding the campaign schedule will be provided only on a "need-to-know" basis.

5.8 SPECIAL CONSIDERATIONS IN PLANNING

Shipments will not be made in adverse weather conditions (i.e., tornado, hurricane, ice storm, or snowstorm) based on weather advisory to be provided by the States. Shipments will occur, to the extent possible, during daylight hours and at times that attempt to avoid high-traffic conditions (i.e., Kentucky State Fair, Kentucky Derby). Fuel stops will be avoided to the extent possible while transport vehicles are loaded with cylinders. A driver's pool list will be provided to State authorities upon request.

6. COMMUNICATIONS

6.1 PRE-NOTIFICATION

States were notified prior to initiating the shipment of cylinders in March 2004. Additional notification will be made prior to commencement of shipment of ANSI-noncompliant cylinders. After this initial notification, the notification of each individual shipment, as well as real time conveyance position tracking, will be provided via TRANSCOM (see Appendix A, URL 17), and States will have the opportunity to participate in tracking through use of this technology.

6.2 EMERGENCY COMMUNICATIONS

Each transport vehicle will be equipped with a citizen's band radio, a cellular telephone, and a direct transporter communication system for contact with the dispatcher, as well as the TRANSCOM system. Direct communication with drivers via cell telephones is made through the ETTP for emergencies only.

6.3 PUBLIC INFORMATION

The States provided public notification along the routes prior to the initiation of cylinder transport in March, 2004.

Requests for information made by the public should be directed to the DOE Public Information Office at 1-865-576-0888.

7. ROLES AND RESPONSIBILITIES

7.1 U.S. DEPARTMENT OF ENERGY

DOE is the owner of the cylinders and their contents, which are being shipped as DOT-compliant nonhighway-route controlled quantity shipments in interstate commerce. DOE has the primary authority and responsibility for control of the cylinder contents following the Atomic Energy Act of 1954, as amended, as well as responsibility for conversion of the material. DOE, along with State authorities has selected the route and will coordinate initiation of the shipping campaign. DOE will provide notification to the States regarding the schedule. DOE has provided information, training, and preparedness assistance to the states to support the shipping campaign.

7.2 BECHTEL JACOBS COMPANY LLC AT THE EAST TENNESSEE TECHNOLOGY PARK

BJC is the DOE Prime Contractor that operates the UF_6 cylinder yards at the ETTP as well as managing DOE-owned UF_6 cylinders at the PORTS GDP (see Appendix A, URL 18). BJC will coordinate planning of the shipments. BJC will act as shipper, receiver, inspector of cylinders, and conveyances, prior to and following shipments; and, through the ETTP Shift Superintendent's Office, will provide 24-hour notification and information in case of an accident or incident. BJC will provide subject matter expert support in the event of an emergency.

As the shipper, BJC is also responsible for proper classification, marking, labeling, packaging, placarding, preparing shipping documents, certification, blocking, and bracing.

7.3 BECHTEL JACOBS COMPANY LLC AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT

The cylinders will be received at the PORTS GDP by BJC or a subsequent DOE contractor, and stored pending conversion or other disposition. Depleted assay cylinders will be converted to a different chemical form at a new plant to be constructed on the PORTS GDP site. Following conversion, it is anticipated that the converted material will be transported to a DOE site in the Western United States for long-term storage. ETTP cylinders containing normal or enriched material represent a very small fraction of the normal and enriched material already onsite at the PORTS GDP, where they will be stored until the economic and technical feasibility of recycle and recovery have been fully evaluated.

7.4 CARRIERS

The carriers are Visionary Solutions LLC (see Appendix A, URL 19), and Visionary's subcontractors. Pursuant to DOT regulations, the carriers are responsible for:

- securing their loads,
- maintaining the shipping papers and emergency plans onboard,
- timely reporting of any incident or accident to their dispatcher and to the shipper through the ETTP PSS Office,
- cleanup and recovery in the event of an incident or accident, and
- transporting the cylinders to the PORTS GDP for off loading.

The carriers will provide drivers who are at least 25 years of age, have HAZMAT endorsement, a statement of training for radioactive transport, and are native born United States citizens.

7.5 STATE OF TENNESSEE

The State of Tennessee is responsible for:

- reviewing this plan and providing input during transportation planning,
- informing local authorities of the campaign,
- providing training and informational support to local authorities,
- maintaining the highway infrastructure,
- determining the need for and requiring the evacuation or sheltering in place of affected residents,
- supporting and advising local first responders,
- providing radiological direction for contamination control,
- providing radiological protection services and response within the State, and
- providing advisories regarding adverse weather conditions for shipments.

7.6 COMMONWEALTH OF KENTUCKY

The Commonwealth of Kentucky is responsible for:

- reviewing this plan and providing input during transportation planning,
- informing local authorities of the campaign,
- providing training and informational support to local authorities,
- maintaining the highway infrastructure,
- determining the need for and requiring the evacuation or sheltering in place of affected residents,
- supporting and advising local first responders,
- providing radiological direction for contamination control,
- providing radiological protection services and response within the State, and
- providing advisories regarding adverse weather conditions for shipments.
- approving carrier's driver pool lists upon submittal.

7.7 STATE OF OHIO

The State of Ohio is responsible for:

- reviewing this plan and providing input during transportation planning,
- informing local authorities of the campaign,
- providing training and informational support to local authorities,
- maintaining the highway infrastructure,
- determining the need for and requiring the evacuation or sheltering-in-place of affected residents,
- supporting and advising local first responders,
- providing radiological direction for contamination control,
- providing radiological protection services and response within the State, and
- providing advisories regarding adverse weather conditions for shipments.

7.8 SOUTHERN STATES ENERGY BOARD

The Southern States Energy Board (see Appendix A, URL 20) is responsible for advising its members, including the State of Tennessee, and the Commonwealth of Kentucky, on issues relating to nuclear energy and nuclear safety, (i.e., the transportation of radioactive materials and fuel cycle materials).

7.9 COUNCIL OF STATE GOVERNMENTS MIDWESTERN OFFICE

The Council of State Governments Midwestern Office (see Appendix A, URL 21) provides research and advisement to its member states, including the State of Ohio and the Commonwealth of Kentucky, on issues including the transportation of radioactive materials, routing of shipments, public involvement in DOE decision-making, and emergency response to transportation accidents involving radioactive and hazardous materials. Kentucky is a member of the Council of State Governments through membership in the Midwestern Governors Association.

8. POINTS OF CONTACT

Department of Energy

Transportation Operations – Brady Lester, 865-576-8354
ETTP Site Office – David Hutchins, 865-241-6420
Emergency – ETTP Shift Superintendent's Office, 865-574-3282
Public Information – Steven L. Wyatt, 865-576-0888

BJC at the ETTP

Operations – Halen Philpot, 865-576-4525
Emergency – ETTP Shift Superintendent's Office, 865-574-3282
Public Information – Steven L. Wyatt, 865-576-0888
Transportation Operations – Anne VanPatter-Stuewe, 865-241-1320

BJC at PORTS

Operations – Mike Eversole, 740-897-2362
Emergency – USEC Plant Shift Superintendent's Office, 740-897-3025
Public Information – Sandy Childers, 740-897-2336

State of Tennessee

Emergency Management – Elgin Usery, 615-741-2879
24 Hr. Warning Point – State Emergency Operations Center, 615-741-0001
Health – Joe Phillips, 615-741-2584
Transportation – Steve Borden, 865-584-2458

Commonwealth of Kentucky

Emergency Management – Homer Druin, 502-607-1661
Health – Robert Johnson, 502-564-3700
Transportation – Joe England, 800-255-2587

State of Ohio

Emergency Management – Carol O'Claire, 614-799-3915
Health – Robert Owen, 614-644-2727
Transportation – Carlisle Smith, 614-728-9126

Southern States Energy Board

Cristopher Wells, 770-242-7712

Council of State Governments Midwestern Office

Lisa Sattler, 920-803-9976

RECORD COPY DISTRIBUTION

File – EMEF-DMC-RC

Appendix A

Reference User Resource Locators

Table A-1: User resource locators for reference web pages

URL No.	Reference or Subject	www Location
1	PORTS FEIS and ROD for conversion	http://web.ead.anl.gov/uranium/documents/portdeis/index.cfm
2	ANSI home page (N14.1 requires site search)	http://webstore.ansi.org/ansidocstore/find.asp
3	DOT home page	http://www.dot.gov/
4	NRC home page	http://www.nrc.gov/
5	10 CFR 71 changes For Oct.1 2004	http://frwebgate3.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=7132619793+1+0+0&WAISaction=retrieve
6	49 CFR 172, 173 changes for Oct. 1 2004	http://frwebgate3.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=7132619793+1+0+0&WAISaction=retrieve
7	10 CFR 71 current and past	http://www.access.gpo.gov/nara/cfr/waisidx_04/10cfr71_04.html
8	49 CFR 173 current and past	http://www.access.gpo.gov/nara/cfr/waisidx_03/49cfr173_03.html
9	Exemption Request for ANSI-compliant and overmass cylinders	http://dms.dot.gov/search/document.cfm?documentid=292453&docketid=18889 – click .pdf link located at the bottom left on page
10	USEC 651: Manual of Good Handling Practices for UF_6	http://www.usec.com/v2001_02/HTML/News_UF6.asp
11	DOT Exemption 13164 for USEC's measurement of cylinder volume	http://hazmat.dot.gov/exemptions/E13164.pdf
12	DOT Exemption 11868 for valve tinning	http://hazmat.dot.gov/exemptions/E11868.pdf
13	Petersen Inc. home page	http://www.petersen-inc.com/index2.htm
14	Certificate of Compliance for the UX-30 Overpack	http://www.rampac.com/certificates/1019196.PDF
15	Duratek, Inc. home page	http://www.duratekinc.com/
16	DOE/RL-96-57, Rev. 0-F, Vol. 1	http://www.rampac.com/dot7a/rl96-57/ptoc.htm
17	TRANSCOM home page	http://www.ntp.doe.gov/transcom/
18	BJC home page	http://www.bechteljacobs.com/
19	Visionary Solutions home page	http://www.eteba.org/Member%20Pages/vision.htm
20	Southern states Energy Board home page	http://www.sseb.org/

Table A-1: User resource locators for reference web pages

URL No.	Reference or Subject	www Location
21	Council of State Governments Midwestern Office home page	http://www.csgmidwest.org/

Appendix B
Applicable Regulation Location Listing

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10 CFR:
71.4 Definitions
SUBPART E, 71.41 through 71.59, Package approval standards.
71.73 Hypothetical accident conditions.
SUBPART G, 71.81 through 71.87 and 71.89 through 71.91, Operating controls and procedures.

49 CFR:
171.2 Matter incorporated by reference
172.1 Purpose and scope.
172.3 Applicability.
172.101 Purpose and use of hazardous materials table.
172.102 Special provisions.
172.200 Applicability.
172.201 Preparation and retention of shipping papers.
172.202 Description of hazardous material on shipping papers.
172.203 Additional description requirements.
172.204 Shipper's certification.
172.300 Applicability.
172.301 General marking requirements for non-bulk packagings.
172.302 General marking requirements for bulk packagings.
172.303 Prohibited marking.
172.304 Marking requirements.
172.308 Authorized abbreviations.
172.310 Class 7 (radioactive) materials.
172.315 Packages containing limited quantities.
172.400 General labeling requirements.
172.400a Exceptions from labeling.
172.401 Prohibited labeling.
172.402 Additional labeling requirements.
172.403 Class 7 (radioactive) material.
172.405 Authorized label modifications.
172.406 Placement of labels.
172.407 Label specifications.
172.436 RADIOACTIVE WHITE-I label.
172.438 RADIOACTIVE YELLOW-II label.
172.440 RADIOACTIVE YELLOW-III label.
172.441 FISSILE label
172.442 CORROSIVE label.
172.450 EMPTY label.
172.500 Applicability of placarding requirements.
172.502 Prohibited and permissive placarding.
172.503 Identification number display on placards.
172.504 General placarding requirements.
172.505 Placarding for subsidiary hazards.
172.506 Providing and affixing placards: Highway.
172.507 Special placarding provisions: Highway.
172.516 Visibility and display of placards.
172.519 General specifications for placards.
172.556 RADIOACTIVE placard.
172.558 CORROSIVE placard.
172.600 Applicability and general requirements.
172.602 Emergency response information.
172.604 Emergency response telephone number.
172.606 Carrier information contact.

172.700 Purpose and scope.
172.701 Federal-State relationship.
172.702 Applicability and responsibility for training and testing.
172.704 Training requirements.
172.800 Purpose and applicability.
172.802 Components of a security plan.
172.804 Relationship to other Federal requirements
173.1 Purpose and scope.
173.2 Hazardous materials classes and index to hazard class definitions.
173.2a Classification of a material having more than one hazard.
173.3 Packaging and exceptions.
173.22a Use of packagings authorized under exemptions.
173.23 Previously authorized packaging.
173.24 General requirements for packagings and packages.
173.24a Additional general requirements for non-bulk packagings and packages.
173.24b Additional general requirements for bulk packagings.
173.25 Authorized packagings and overpacks.
173.26 Quantity limitations.
173.29 Empty packagings.
173.30 Loading and unloading of transport vehicles.
173.40 General packaging requirements for toxic materials packaged in cylinders.
173.61 Mixed packaging requirements.
173.401 Scope.
173.403 Definitions.
173.410 General design requirements.
173.412 Additional design requirements for Type A packages.
173.415 Authorized Type A packages.
173.417 Authorized fissile materials packages.
173.420 Uranium hexafluoride (fissile, fissile excepted and non-fissile).
173.423 Requirements for multiple hazard limited quantity Class 7 (radioactive) materials.
173.425 Table of activity limits--excepted quantities and articles.
173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).
173.428 Empty Class 7 (radioactive) materials packaging.
173.431 Activity limits for Type A and Type B packages.
173.433 Requirements for determining A1 and A2 values for radionuclides and for the listing of radionuclides on shipping papers and labels.
173.434 Activity-mass relationships for uranium and natural thorium.
173.435 Table of A1 and A2 values for radionuclides.
173.441 Radiation level limitations.
173.442 Thermal limitations.
173.443 Contamination control.
173.447 Storage incident to transportation--general requirements.
173.448 General transportation requirements.
173.453 Fissile materials--exceptions.
173.457 Transportation of fissile material, controlled shipments--specific requirements.
173.459 Mixing of fissile material packages.
173.461 Demonstration of compliance with tests.
173.462 Preparation of specimens for testing.
173.465 Type A packaging tests.
173.466 Additional tests for Type A packagings designed for liquids and gases.
173.467 Tests for demonstrating the ability of Type B and fissile materials packagings to withstand accident conditions in transportation.
173.471 Requirements for U.S. Nuclear Regulatory Commission approved packages.
173.472 Requirements for exporting DOT Specification Type B and fissile packages.
173.474 Quality control for construction of packaging.

173.475 Quality control requirements prior to each shipment of Class 7 (radioactive) materials.
173.476 Approval of special form Class 7 (radioactive) materials.
177.800 Purpose and scope of this part and responsibility for compliance and training.
177.801 Unacceptable hazardous materials shipments.
177.802 Inspection.
177.804 Compliance with Federal Motor Carrier Safety Regulations.
177.810 Vehicular tunnels.
177.816 Driver training.
177.817 Shipping papers.
177.823 Movement of motor vehicles in emergency situations.
177.834 General requirements.
177.842 Class 7 (radioactive) material.
177.843 Contamination of vehicles.
177.848 Segregation of hazardous materials.
177.854 Disabled vehicles and broken or leaking packages; repairs.
178.350 Specification 7A; general packaging, Type A.
179.300 and 301 Specification for Class DOT-106A multi-unit tank car tank
393.100 through 393.114 parts and accessories - tie downs